UNITED STATES PATENT AND TRADEMARK OFFICE

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10/767,658	01/29/2004	Masaki Okamoto	36409	5389

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EXAMINER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

	Application No.	Applicant(s)
Office Action Summary	10/767,658	OKAMOTO ET AL.
	Examiner	Art Unit	
	Shambhavi Patel	2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on <u>19 November 2007</u>.

2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-19* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *1-19* is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☐ All b) ☐ Some * c) ☐ None of:

       1. ☐ Certified copies of the priority documents have been received.

       2. ☐ Certified copies of the priority documents have been received in Application No. _____.

       3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

1.   This Office Action is in response to the Amendment and Remarks submitted on 13 November 2007.

2.   Claims 1-19 have been presented for examination.

Response to Arguments

3.   Applicant's arguments filed 13 November 2007 have been fully considered but they are not persuasive.

Regarding the 35 U.S.C. 101 rejection:

    i.   **Applicant submits,** on page 10 of the remarks, that the amendments to independent claims 1 and 14 overcome the previously issued 35 U.S.C. 101 rejection.

    Examiner notes that the term "computer-readable medium" is not defined (or even recited) in the specification. Thus, storing the result on a computer-readable medium is not necessarily statutory. The rejection is maintained. Claim 19 was not previously rejected under 101 because it did not recite or depend from a claim that recited the term "computer-readable medium". However, claim 14 has been amended to recite "computer-readable medium" and because this term is indefinite, claim 19 is also rejected under 101.

Regarding the 35 U.S.C. 102 rejections:

    ii.   **Applicant submits,** on pages 13-14 of the remarks, Sarvar does not disclose the claimed limitations because "Sarvar et al. teaches simulating peak temperature based on specific heat data which is empirically derived." **Applicant further submits** "The Examiner asserts that the specific heat data is not empirically derived but that this data 'may be calculated (i.e. simulated) by monitoring the heat flow'...Applicants respectfully disagree for at least two reasons. First, a calculation or calculated result <u>and</u> a simulation or simulated result are not equivalent nor does one imply or suggest the other"

    Examiner notes that per the Applicant's own admission, a simulation step may comprise "...executing an interpolation calculation using the analysis result data" **(see page 4 of the specification).** Similarly, Sarvar discloses the **calculation** of heat capacity values based on empirical results and the interpolation of these results to calculate the varying heat capacity values that are used for the next simulation **(Sarvar: section IV.B and IV.C).** Thus, the calculation of the heat capacity values is a simulation and the resulting calculated heat capacity values are simulated conditions and the rejection is maintained.

iii. **Applicant submits,** on page 13 of the remarks, "For similar reasons as discussed above, Sarver et al. fails

to teach or suggest executing a simulation of the second step based on a second condition, wherein the

second condition comprises the simulation condition at least a third condition in order to yield a second

simulation result, as recited in the rejected claims."

Examiner notes that as shown above, the heat capacity values are simulated conditions, and thus Sarvar

discloses this limitation.

iv. **Applicant submits,** on page 11 of the remarks, that Sarvar does not disclose the limitation "...from the

condition table and a condition input from the inputting portion" because "Sarvar et al. related to

empirically·deriving varying specific heat capacity values and then simulating a peak temperature."

Examiner notes that the specific heat data is not empirically derived; rather, it is calculated from

empirically derived data, and is a simulated condition. The rejection is maintained.

Specification

4.　　　The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter.

See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: the specification does not

define the term "computer readable medium".

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter,
> or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and
> requirements of this title.

5.　　　**Claims 1-12 and 14-19 are rejected under 35 U.S.C. 101** because the claimed invention is directed to

non-statutory subject matter. See MPEP Section 2106 which recites:

> The tangible requirement does not necessarily mean that a claim must either be tied to a particular machine or
> apparatus or must operate to change articles or materials to a different state or thing. However, the tangible
> requirement does require that the claim must recite more than a 35 U.S.C. 101 judicial exception, in that the
> process claim must set forth a practical application of that judicial exception to produce a real-world result.
> Benson, 409 U.S. at 71-72, 175 USPQ at 676-77 (invention ineligible because had "no substantial practical
> application."). "[A]n application of a law of nature or mathematical formula to a ... process may well be
> deserving of patent protection." Diehr, 450 U.S. at 187, 209 USPQ at 8 (emphasis added); see also Corning,
> 56 U.S. (15 How.) at 268, 14 L.Ed. 683 ("It is for the discovery or invention of some practical method or
> means of producing a beneficial result or effect, that a patent is granted . . ."). In other words, the opposite
> meaning of "tangible" is "abstract."

Claim 1 is directed to a mounting process simulation program. **Claim 14** is directed to a mounting process simulation method of executing a simulation of a mounting process composed of a plurality of steps. The claimed subject matter lacks a practical application of a judicial exception (law of nature, abstract idea, naturally occurring article/phenomenon) since it fails to produce a useful, concrete and tangible result. Specifically, the claimed subject matter does not produce a tangible result because the claimed subject matter fails to produce a result that is limited to having real world value rather than a result that may be interpreted to be abstract in nature as, for example, a thought, a computation, or manipulated data. More specifically, the claimed subject matter provides for a second simulation result. This produced result remains in the abstract and, thus, fails to achieve the required status of having real world value. As noted above, the term "computer readable medium" is not defined in the specification.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6.   Claims 1-12 and 14-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Sarvar et al.**

(**'Effective Modeling of the Reflow Soldering Process: Basis, Construction, and Operation of a Process**

Model'), herein referred to as Sarvar.

Regarding claims 1 and 14:

Sarvar discloses a mounting process simulation program recorded on a computer-readable medium of

causing a computer to execute a simulation of a mounting process composed of a plurality of steps, and a method of

executing a simulation, comprising:

   a.   a first simulation executing step of executing a simulation (**IV.B: specific heat capacity**

        calculated (i.e. simulated)) based on a first condition selected for a first step (**IV.B: heat flow**).

   b.   a simulation condition deciding step of selecting a simulated result from the first simulation

        executing step as a simulation condition for a second step positioned subsequent to the first step

        (**Table III; 'Modeling of an Exemplar Product and Process Combination'**). The specific heat

        capacity is varied, and this value is used to calculate the peak temperatures.

   c.   a second simulation executing step of executing a simulation-of the second step based on a second

        condition containing at least the simulation condition and a third condition that yields a second

        simulation result that is stored on the computer readable medium (**Table III**). The second

        condition, *specific heat capacity,* is simulated to obtain the peak temperature. Sarvar does not

        explicitly disclose a third condition. However, the simulation would obviously include properties

        of the materials being simulated, which are interpreted to be analogous to the third condition of the

        claim.

Regarding claim 2:

        Sarvar discloses simulating a typical reflow profile (**page 128 'Radiative Heating'**). The temperature is

varied with time *(conditions),* and this data is used to calculate the output. Therefore, the output *(analysis data)* is

calculated during *each* temperature variation. The Examiner interprets 'analysis result data' to be data produced in

the first simulation step that is then analyzed and/or sampled in the second simulation step, and 'wherein analysis

result data simulated previously based on a plurality of conditions are generated every step' to mean that this data is produced at every step.

Regarding claim 3:

Sarvar discloses varying the specific heat capacity to record the temperature changes **(page 131 'Modeling Variable Materials Data' paragraphs 1-3).** The variable behavior of the specific heat capacity is represented in the models using *interpolation tables for each variable material.* **Sarvar discloses** simulating a typical reflow profile **(page 128 'Radiative Heating').** The temperature is varied with time *(conditions)*, and this data is used to calculate the output. Therefore, the output *(analysis data)* is calculated during *each* temperature variation. The Examiner interprets 'analysis result data' to be any data produced in the first simulation step that is then analyzed and/or sampled in the second simulation step, and 'wherein analysis result data simulated previously based on a plurality of conditions are generated every step' to mean that this data is produced at every step.

Regarding claim 4:

Sarvar discloses deriving the specific heat capacity by using the heat flow from samples analyzed with a calibrated Mettler TA3000 differential scanning calorimeter **(page 129 'Specific Heat Capacity Values' paragraph 1).** This is analogous to the outside device in the claim language. The derived value is then converted to a computed-readable value and used in the simulation **(page 132 'Modeling of an Exemplar Product and Process Combination' paragraph 1). Sarvar discloses** simulating a typical reflow profile **(page 128 'Radiative Heating').** The temperature is varied with time *(conditions)*, and this data is used to calculate the output. Therefore, the output *(analysis data)* is calculated during *each* temperature variation. The Examiner interprets 'analysis result data' to be any data produced in the first simulation step that is then analyzed and/or sampled in the second simulation step.

Regarding claim 5:

Sarvar discloses the simulation program of claim 4 wherein the experimental data simulated at every step via a CAE tool is selected as the analysis result data **(page 127 'Outline of System Components' 2nd paragraph; page 129 'Specific Heat Capacity Values' paragraph 1),** wherein the type of data selected as the analysis result

data is converted to a common format **(figure 1 post processing and data presentation).** The specific heat capacity is experimentally derived and is then used in the simulation as the analysis result data to calculate its effect on the temperature variation **(page 132 'Modeling of an Exemplar Product and Process Combination' paragraph 1).**

Regarding claim 6:

Sarvar discloses a mounting process simulation program recorded on a computer-readable medium according to claim 1, further causing the computer to execute an animation displaying step of displaying three-dimensionally an animation to indicate a result simulated in the second simulation executing step on a display device, by reading previously- stored animation elements based on a definition file in which an operation sequence is defined every step **(figure 8; page 132 'Modeling of an Exemplar Product and Process Combination' paragraph 1).**

Regarding claim 7:

Sarvar discloses a mounting process simulation program recorded on a computer-readable medium according to claim 1, wherein the second simulation executing step includes a condition acquiring step of reading a condition selected in response to an input from a condition database in which a plurality of conditions are stored previously in combination, and adding the condition to the second condition **(page 131 'Modeling Variable Materials Data' paragraph 3).** The specific heat capacity is modeled using tables.

Regarding claim 8:

Sarvar discloses a mounting process simulation program recorded on a computer-readable medium according to claim 7, wherein the condition acquiring step further reads data from a CAD system in response to the input and adds the data to the second condition **(figure 1).**

Regarding claim 9:

Sarvar discloses a mounting process simulation program recorded on a computer-readable medium according to claim 1, wherein the first simulation executing step executes the simulation to contain production

variation in the first step (**Table III: production variation specific heat capacity**), the simulation condition

deciding step decides the result simulated in the first simulation executing step to contain the production variation as

the simulation condition and the second simulation executing step executes the simulation of the second step based

on the second condition to contain the production variation (**Table III: simulation to determine variation in**

temperature due to variation in specific heat capacity).

Regarding claim 10:

Sarvar discloses a mounting process simulation program recorded on a computer-readable medium

according to claim 1, wherein the first simulation executing step executes the simulation based on a change of a

control item set in the first step as the first condition (**IV.B first condition is heat flow**), the simulation condition

deciding step decides the result simulated based on the change of the control item in the first simulation executing

step as the simulation condition (**IV.B first simulation calculated specific heat capacities**), and the second

simulation executing step executes the simulation of the second step based on the second condition to contain the

result simulated based on at least the change of the control item (**Table III: simulation to determine variation in**

temperature due to variation in specific heat capacity).

Regarding claim 11:

Sarvar discloses a mounting process simulation program recorded on a computer-readable medium

according to claim 1, further causing the computer to execute a reliability evaluating step of executing a reliability

evaluation of a product manufactured in the mounting process by using the result simulated in the second simulation

executing step (**figure 6**).

Regarding claim 12:

Sarvar discloses a mounting process simulation program recorded on a computer-readable medium

according to claim 1, further causing the computer to execute a fraction defective calculating step of calculating a

fraction defective of a product manufactured in the first step and the second step, by using results simulated in the

first simulation executing step and the second simulation executing step (**Introduction: paragraphs 2 and 3**).

Regarding claims 15 and 17:

Sarvar discloses selecting the first, second, and third condition from a plurality of conditions (section IV.B; table III). The plurality of conditions include the specific heat capacities, the heat flow, and the material properties.

Regarding claims 16 and 18:

Sarvar discloses the program of claim 15 wherein the plurality of conditions include part conditions (section IV.B heat flow).

Regarding claim 19:

Sarvar discloses displaying the results (figures 4 and 5). Sarvar does not explicitly disclose a 3D animation of the results. A skilled artisan would obviously have included this functionality because its results in a more user-friendly presentation.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7.   **Claim 13 is rejected under 35 U.S.C. 102(b) as being clearly anticipated by Sarvar et al. ('Effective Modeling of the Reflow Soldering Process: Basis, Construction, and Operation of a Process Model'),** herein referred to as Sarvar.

Regarding claim 13:

Sarvar discloses a mounting process simulation system provided to steps of a mounting process composed of a plurality of steps to execute a simulation of the mounting process, comprising:

a. an inputting portion for inputting a plurality of conditions to execute the simulation

(figure 1; IV.B; table III: heat flow, specific heat capacity)

b. an executing portion for executing the simulation based on the condition input from the

inputting portion **(figure 1)**

c. an outputting portion for outputting a result of the simulation executed by the executing

portion **(figure 1)**

d. wherein the executing portion includes:

   i. a condition table forming portion that forms a condition table of a second step

   positioned subsequently to a first step, whereby the condition table is formed by

   using a simulation result simulated based on a first condition selected for at least a

   first step, of a second step positioned subsequently to a first step **(IV.B: first**

   condition is heat flow and first simulated result is specific heat capacities) The

   specific heat capacities is modeled using an *interpolation table*. The first step is

   varying the heat capacity, and the second step is measuring the temperature.

   ii. simulation result outputting portion executes the simulation of the second step based

   on the condition data from the condition table and a condition input from the

   inputting portion and outputs a result to the outputting portion **(page 131 'Modeling**

   Variable Materials Data' paragraphs 1-3). The variation of the temperature is

   calculated based on this first condition.

Conclusion

8.   **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

7.   **Examiner's Remarks:** Examiner has cited particular columns and line numbers in the references applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in their entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner. In the case of amending the claimed invention, Applicant is respectfully requested to indicate the portion(s) of the specification which dictate(s) the structure relied on for proper interpretation and also to verify and ascertain the metes and bounds of the claimed invention.
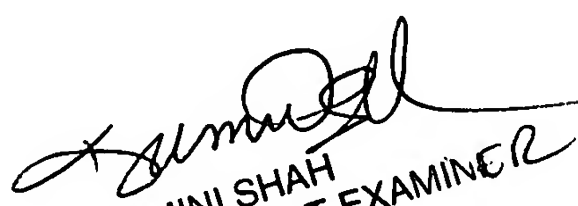
8.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shambhavi Patel whose telephone number is (571) 272-5877. The examiner can normally be reached on Monday-Friday, 8:00 am – 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamini Shah can be reached on (571) 272-2279. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information

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or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more

information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the

Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SKP

KAMINI SHAH
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